

NBSIR 76-1006 (R)

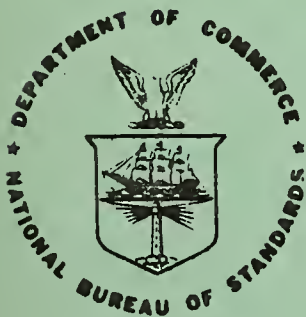
Report of the Ad Hoc Committee on NBS Inventions and Patent Programs

Ad Hoc Committee on NBS Patent Programs, F. Karl Willenbrock, Chairman

Institute for Applied Technology
National Bureau of Standards
Washington, D. C. 20234

March 1976

Final



U S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS

NBSIR 76-1006

**REPORT OF THE Ad Hoc
COMMITTEE ON NBS INVENTIONS
AND PATENT PROGRAMS**

Ad Hoc Committee on NBS Patent Programs, F. Karl Willenbrock, Chairman

Institute for Applied Technology
National Bureau of Standards
Washington, D. C. 20234

March 1976

Final

U.S. DEPARTMENT OF COMMERCE, Elliot L. Richardson, *Secretary*
James A. Baker, III, *Under Secretary*
Dr. Betsy Ancker-Johnson, *Assistant Secretary for Science and Technology*
NATIONAL BUREAU OF STANDARDS, Ernest Ambler, *Acting Director*

Table of Contents

Report and Discussion of the Findings and Recommendations of the Ad Hoc NBS Committee on Patent Programs February 26, 1975

| | | |
|-----|--|----|
| I. | Investigations of the Ad Hoc Committee | 1 |
| A. | Patent and Non-Patent Methods for Disclosure of Government Inventions | 1 |
| B. | Invention Protection Objectives. | 2 |
| 1. | Royalty Payment Protection | 2 |
| 2. | Economic Benefits. | 3 |
| C. | Government-Wide Patent Policy. | 4 |
| 1. | Presidential Policy Statement of 1971. | 4 |
| 2. | Legal Complications. | 4 |
| D. | Survey of Patent Practices in Government Agencies. | 5 |
| 1. | Incentive Awards for Government Inventors. | 6 |
| 2. | Government Agency Licensing Practices. | 7 |
| 3. | Data on Patent Activity for Employee Inventions of Selected Government Agencies. | 9 |
| | Table I: Data on Patent Activity for Employee Inventions of Selected Government Agencies. | 10 |
| E. | NBS Patent Practices | 12 |
| 1. | The NBS Committee on Patents | 12 |
| 2. | NBS Inventions Summary | 15 |
| 3. | NBS Contractor Inventions. | 16 |
| 4. | Commercial Use of NBS Inventions | 18 |
| II. | Findings | 21 |
| A. | Strengths and Weaknesses in the NBS's Patent Practices | 21 |
| 1. | Strengths. | 21 |

| | |
|--|-----|
| 2. Weaknesses | .22 |
| III. Recommendations. | .24 |
| A. The Basic Premise. | .24 |
| IV. Estimated Workload Increases and Implementation Costs. | .28 |
| A. Estimated Workload Increases | .28 |
| B. Estimated Implementation Costs | .30 |
| 1. Current Costs. | .30 |
| 2. Additional Direct Costs. | .30 |

THE FINAL REPORT OF THE AD HOC COMMITTEE ON NBS PATENT PROGRAMS

An Ad Hoc Committee on NBS Patent Programs consisting of A. McCoubrey, M. Greenspan, R. Barra, C. Gravatt, D. Robbins, A. Farrar, and F. K. Willenbrock, Chairman, was established on June 23, 1974, to investigate the reasons for the small number of patent applications filed by NBS each year. The Committee was assisted by Peter Urbach, Deputy Director of NTIS, and Lawrence Eicher, IAT. The purpose of the investigation was to determine what was needed to create a climate among the NBS professional staff which encourages innovative and inventive activity, and the disclosure of inventions.

In the course of their investigation, the Ad Hoc Committee found:

1. That a comparison of patent activities at NBS and eight other Federal agencies*, from 1963 to 1972 showed that NBS averaged 3.7 invention disclosures per 100 scientist/engineer employees compared to a low of 2.1 in the Department of Interior and a high of 8.5 in the Department of Defense. The eight agency average was 4.2. Patent and invention disclosure activity at NBS is similar to that of other agencies not having inventor award programs and below those which do have award programs;
2. That the number of NBS patented inventions is not a complete measure of the inventive and innovative activities at NBS. Although patenting can be an important mechanism for transferring technology and helps promote commercial utilization of NBS research results, NBS scientists and engineers often help develop innovative technical solutions to technical problems and disclose them through papers, lectures, and demonstrations without determining whether or not the technical solution qualifies as a patentable invention;
3. That NBS has no operative program for granting awards to inventors for invention disclosures or patent applications, and that there has been no systematic effort to recognize NBS inventors whose inventions have been used in industry;
4. That NBS inventions which have been developed to a point of practical application at the time of patenting or publication (for example, the NBS contra-angle dental handpiece) are available immediately for public use. However, many NBS inventions require further development by either NBS or the private sector. In some cases where private investment is needed to develop NBS inventions, the absence of statutory authority for certain Government agencies to grant limited exclusive licenses on patents discourages such investment; and

*The Department of Health, Education and Welfare; Department of Agriculture; Department of Transportation; Department of Interior; Tennessee Valley Authority; Energy Research and Development Administration; National Aeronautics and Space Administration and the Department of Defense.

5. That important potential benefits to the public may result from foreign licensing, and in certain cases from limited exclusive domestic licensing.

As a result of their investigation, the Ad Hoc Committee recommends:

1. That NBS should, under existing authority, aggressively support an inventor award program to improve the climate for invention disclosure at NBS. Cash awards of \$100 should be given to NBS inventors for each invention disclosure that is assignable to NBS and is recommended for publication or patent application by the NBS Committee on Patents. It is further recommended that NBS should establish a special award of up to \$25,000, as authorized by Civil Service Regulations, that can be granted to an NBS employee for an invention that constitutes an outstanding contribution to society;
2. That in cases where the NBS Committee on Patents determines that an invention made by an NBS employee is directly related to an NBS mission and that the invention requires further development to demonstrate its practical application, the Committee should report these conclusions to the appropriate NBS Institute Director so that further development is encouraged;
3. That NBS actively support the Department of Commerce in its efforts to obtain statutory authority to grant limited exclusive licenses on NBS patents when it is in the public interest to do so;
4. That the criteria presently used by the NBS Committee on Patents to determine whether NBS inventions should be published or patented (Attachment A: Section E, Item 1) should be considered for revision as a separate undertaking, taking into account the relative merits of patenting and publication as means for protecting NBS inventions, and for helping to promote their commercial use. Consideration should be given to: the economic potential of the invention; the amount of further development needed to bring the invention to the point of practical application; and to the possibility that limited exclusive licensing may become available and whether or not such licensing will be a necessary incentive for the investment of private risk capital to bring the invention to the market place; and
5. That NBS should strengthen its program to disseminate information about NBS inventions to potential users. Such a program should include:
 - (a) Continuing public announcement of all NBS patents and patent applications in cooperation with the National Technical Information Service (NTIS) and publication of brief descriptions of NBS inventions in NBS Technical Notes.

- (b) Additional promotional activities for NBS inventions selected to receive special emphasis. Such activities might include invitational conferences, the preparation of special displays for trade conventions or offers of technical assistance and could be undertaken in cooperation with NTIS when appropriate.

The Ad Hoc Committee estimated that the implementation of the first four recommendations would cost approximately \$15,000 per year and could be expected to improve the climate for inventive activity and invention disclosure at NBS, and significantly increase the number of NBS patents.

A complete and full discussion of the findings and recommendations of the Ad Hoc Committee on Patent Programs is included as Attachment A.

Attachment

ATTACHMENT A

Report and Discussion of the Findings and Recommendations of the Ad Hoc
NBS Committee on Patent Programs
February 26, 1975

Members: Arthur McCoubrey, Martin Greenspan, Ralph Barra, Claude Gravatt,
David Robbins, Allen Farrar, Peter Urbach (NTIS), Lawrence Eicher,
and F. Karl Willenbrock (Chairman)

I. Investigations of the Ad Hoc Committee

The investigations of the Committee have focused primarily on Government employee inventions because most NBS inventions fall into this category. With the exception of section I-E-3, which describes NBS's limited experience with contractor inventions, the findings and recommendations of this report are strictly applicable to NBS employee inventions only.

A. Patent and Non-Patent Methods for Disclosure of Government Inventions

Inventions resulting from the work of Government employees may be made available for use in the following ways:

- ° Public use of the invention.
- ° Describing the invention in a publication or at a public meeting.
- ° Applying for a patent.

Although public use or publication does not result in the grant of a patent to the Government, these ways for making an invention available for use tend to prevent others from obtaining a patent

on the same invention. That is, if a second inventor applies for a patent on the invention, the Patent and Trademark Office may reject his application on the grounds that it is not patentable in view of previous public use or publication.

When a patent is not obtained on a Government invention, its development and use is not restricted. When a Government agency chooses to patent an invention, the development and use of the invention by non-Government parties is subject to the patent licensing policies of that agency.

B. Invention Protection Objectives

1. Royalty Payment Protection: Patenting employee inventions protects the Government from paying royalties to a second inventor for use of an invention that was first made by a Government employee. The Government obtains less protection if such inventions are placed in the public domain by public use or publication. In those rare cases where priority of an invention is claimed by the Government and another party, the Government is in a stronger legal position to prove priority if the invention has been covered in a patent application rather than disclosed by publication or public use.

It is difficult to estimate the amount of money saved by the Government and the general public by avoidance of royalty payments to a second inventor because:

- (a) there has been no careful audit of commercial utilization of Government patented inventions, and
- (b) it is impossible to determine what would have happened if the Government had not had patent protection in a particular case.

2. Economic Benefits: Normally, the Government does not charge royalties under licenses granted to U.S. citizens or U.S. corporations on Government inventions. However, inventions in scientific and technological fields resulting from work performed by Government employees or contractors constitute a potentially valuable national resource. The public interest in a dynamic and efficient economy requires that efforts be made to encourage timely development and use of these inventions. NTIS's experience with its newly established program for promoting the use of Government inventions suggests that an effective program to encourage the development and use of Government inventions could result in increased tax revenues that would more than pay for the program's operation.

C. Government-Wide Patent Policy

1. Presidential Policy Statement of 1971: On August 23, 1971, the President issued a revised memorandum and statement of Government Patent Policy addressed to the Heads of Executive departments and agencies. Revisions contained in the 1971 Presidential Policy Statement were based on the results of studies and experience gained under the 1963 Presidential Policy Statement. A major revision of the President's 1971 Statement on Government Patent Policy provides that Government-owned patents shall be made available, and the technological advances covered thereby brought into being in the shortest possible time, through dedication of exclusive or non-exclusive licenses under regulations prescribed by the Administrator of General Services.
2. Legal Complications: The 1971 Presidential Policy provisions were subsequently implemented as part of GSA's Federal Property Management Regulations concerning Government-owned patents. A major premise of these regulations is that to obtain commercial utilization of an invention covered in a Government-owned patent, it may be necessary to grant an exclusive license for a limited period of time as an incentive for the investment of risk capital to achieve the practical application of the invention. Shortly after the GSA regulations

were announced on February 5, 1973, a group called Public Citizens, Inc., along with 11 Congressmen successfully challenged (in the U.S. District Court for the District of Columbia) the GSA exclusive licensing regulations as unconstitutional on the basis that the Executive may not dispose of government property without Legislative approval. The court's decision has been appealed but a decision by the Court of Appeals has not yet been rendered.

It should be noted that NASA, NSF, and ERDA, the successor agency to AEC, have statutory authority to grant exclusive licenses on their patents. This authority, which was written into their organic legislation, is not being contested in the courts.

D. Survey of Patent Practices in Government Agencies

Review of the patent activities of the various Government agencies shows significant differences in encouraging employee and contractor invention disclosure, and in promoting the development and use of agency inventions. These differences are due in part to differences in the R&D missions of the agencies, but also reflect management decision within the agencies involved as to the importance of seeking patents.

1. Incentive Awards for Government Inventors: Chapter 45, Title 5 of the U.S. Code is the basic law governing the granting of awards for Government employee inventors. Under this law departments and agencies may grant cash incentive awards for inventive achievement ranging from \$25 to \$25,000. Awards in excess of \$5,000 may be granted only with prior approval of the Civil Service Commission.
 - a. Passive Inventor Awards Programs: DoC including NBS, HEW, NSF and USDA are examples of agencies that do not normally give awards for invention disclosure or patents. These agencies do operate incentive awards programs in which outstanding achievement awards may be and sometimes are given to inventors. Jacob Rabinow was given an NBS Exceptional Service Award and the DoC Gold Medal for his magnetic particle clutch invention in 1947.
 - b. Active Inventor Award Program: The Air Force, the Department of Transportation, and the Department of Interior give small automatic cash awards (usually \$50) for each invention disclosure. If the invention is patented, some agencies give the inventor an additional award of \$100. The Army and Navy also give small cash awards for invention disclosures on the recommendation of special review boards. ERDA does not grant awards to its own employees for inventions. However, most ERDA inventions are made by contract employees, and the

major ERDA contractors (e.g., Union Carbide at Oak Ridge) do operate patent award systems.

- c. An Agressive Inventor Award Program: NASA, which operates its inventor award program under statutory authority that is separate from Title 5 of the U.S. Code, gives cash awards for patents as determined by its Inventions and Contributions Board. In FY 1974, NASA gave 224 individual awards ranging from \$100 to \$25,000 with ten of the awards in excess of \$1,000. The NASA inventor award system also covers NASA contractors in other Government agencies. For example, an NBS employee at Boulder (Daniel H. Weitzel) received a NASA patent award in 1971 for a flowmeter invention.

2. Government Agency Licensing Practices: The degree to which the Government can encourage the expeditious development and civilian use of its inventions depends to some extent on the patent licensing options available to Government agencies. The patent laws establish a 17-year monopoly (limited period of exclusivity) as a reward for invention and the disclosure of the invention to the general public. The monopoly may act as an incentive for private risk capital to develop the invention and make its benefits available to the public. This investment protection could be extended to Government patented invention development

through limited exclusive license arrangements with responsible applicants in the private sector. As noted in Section C, item 2 above, GSA's revised patent licensing regulations were intended to make the exclusive licensing options available to all departments and agencies. However, a final adjudication of the constitutionality of these regulations has not yet been rendered by the court.

- a. Non-Exclusive Licensing Disincentives: Without the exclusive licensing option, most Government agencies will undoubtedly continue to grant non-exclusive, royalty-free licenses on their patents. In the period from 1963 through 1971, 99.9% of the licenses issued on Government-held patents were non-exclusive. This type of licensing can create disincentives for private investment in the development of Government patented inventions. An illustration of this kind of disincentive is given for a specific NBS invention in Section E.
- b. Exclusive Licensing: NASA, ERDA, and NSF are the only Government agencies that have statutory authority to grant exclusive licenses on their patents.

In cases where patent rights are assigned to NASA or ERDA provisions for limited exclusive licensing to responsible applicants are made when such licensing is deemed in the public interest. Determining when exclusive

licensing is appropriate and selecting appropriate licensees is a difficult procedure, requiring both legal and technical review. NASA has granted 14 exclusive licenses since 1967. Each exclusive license application is reviewed by the NASA Inventions and Contributions Board which in turn recommends action to the NASA Administrator. ERDA has established procedures for granting exclusive licenses and has reviewed several applications, but has never granted an exclusive license on an ERDA patent.

NSF has not granted any exclusive licenses although it does have the statutory authority to do so.

HEW has granted several exclusive licenses based on internal (non-statutory) regulations which were issued before the GSA regulations, and is continuing to accept exclusive license applications recognizing that their actions may be subject to legal challenge on the same grounds used against the GSA regulations.

3. Data on Patent Activity for Employee Inventions of Selected Government Agencies: Table I on the following page presents data compiled from the "Annual Report on Government Patent Policy: 1971-72" of the Federal Council for Science and Technology; the 1971 edition of NSF's "Reviews of Data on Scientific Resources - Federal Scientific and Health Personnel;" and NBS records.

TABLE I: DATA ON PATENT ACTIVITY FOR EMPLOYEE INVENTIONS OF SELECTED GOVERNMENT AGENCIES

| | Total NBS/Commerce | HEW | USDA | DOT | Interior | TVA | AEC (EPDA) | NASA | Defense |
|--|-----------------------|-------|-------|------|----------|------|---------------|--------|---------|
| Disclosures (1963-1972) | (512) 641 | 318 | 1,867 | 153 | 843 | 441 | 205 | 4,049 | 20,194 |
| Applications (1963-1972) | (50) 66 | 85 | 1,354 | 31 | 363 | 105 | 30 | 1,420 | 10,001 |
| % Disclosures filed (1963-1972) | (10.3) 10.3 | 26.7 | 72.5 | 20.3 | 43.1 | 23.8 | 14.6 | 35.1 | 49.6 |
| Patents (1963-1972) | (86) 104 | 48 | 946 | 18 | 297 | 62 | 28 | 1,177 | 8,468 |
| R&D Funds, \$M (1963-1972) | (271) 604 | 2,211 | 1,777 | 516 | 1,078 | 69 | 178 | 15,134 | 17,509 |
| R&D Funds, \$M/patent (1963-1972) | (3.15) 5.81 | 41.6 | 1.9 | 28.7 | 3.6 | 1.1 | 6.3 | 12.9 | 2.07 |
| Active Patents (1972) | (223) 251 | 175 | 1,444 | 55 | 415 | 97 | 4,623 | 1,903 | 14,419 |
| No. of Patents Licensed (1972) | (33) 34 | 16 | 160 | 0 | 64 | 26 | 560 | 107 | 215 |
| % of Active Patents Licensed (1972) | (14.8) 13.5 | 9.1 | 11.1 | 0 | 15.4 | 26.8 | 12.1 | 5.6 | 1.5 |
| Disclosures (1971) | (52) 75 | 60 | 152 | 32 | 76 | -- | 19 | 350 | 2,007 |
| *Scientists and Engineers in R&D (1971) | (1409) 2,319 | 2,636 | 4,693 | 679 | 3,623 | -- | 391 | 6,794 | 23,572 |
| *Disclosures (1971) per 100 Scientists and Engineers R&D | (3.7) 3.2 | 2.3 | 3.2 | 4.7 | 2.1 | -- | 4.9 | 5.2 | 8.5 |

*Intramural Scientists and Engineers - does not include contractors.

These data may be regarded as indicators of patent activity in the various Government departments and agencies. Because of the time-lag involved in invention evaluation and patenting procedures, one area of data may appear to be inconsistent with another. For example, Table I shows that DoC obtained 104 patents in the FY 1963-1972 period, but filed only 66 patent applications in the same period. This apparent inconsistency is due to the large number of NBS patent applications which were filed in the U.S. Patent and Trademark Office prior to 1962, but were not examined and issued as patents until 1962 and later.

- a. Patent Activity Ratios: The ratio of R&D funds obligated, to the number of inventions patented varies widely among the agencies. The variation may be attributable to several factors. For example, the relative proportion of R&D funds used for basic research, applied research, and systems development (including hardware purchases) varies widely among agencies.

The ratio of employee invention disclosures to the number of scientists and engineers in intramural R&D programs, may be a more sensitive indicator of employee inventive activity in the various agencies.

E. NBS Patent Practices

1. The NBS Committee on Patents: The NBS Committee on Patents (Lawrence Wood, Jacob Rabinow, Martin Greenspan, David Robbins, and G. Franklin Montgomery) is the standing committee which determines which NBS inventions should be protected by patenting or publication.
 - a. The criteria, used by the NBS Committee on Patents for determining when NBS inventions should be protected by patenting or publication, are based primarily on the need to protect the Government and the general public from paying royalties to a second inventor on inventions that are first made by Government employees. Occasionally, the Committee will recommend that a patent application be filed on an invention because it is directly related to a primary NBS mission and represents a significant advance in the art related to that mission, even though the market for the invention is not significant. The primary criteria used by the Committee may be summarized as follows:

- (1) When an invention is assignable to the Government, a domestic patent application should be filed on the invention when it is judged to have high potential for commercial success in this country, as judged by estimated sales to the Government and the general public (e.g., sales greater than \$1 million over a 17-year period).
 - (2) When an invention is assignable to the Government, it should be protected by publication when it is judged to have moderate potential for domestic commercial success, as judged by estimated sales to the Government and general public (e.g., sales greater than \$75,000 and less than \$1 million over a 17-year period).
 - (3) When all rights in an invention remain with the employee inventor, subject to a royalty-free license to the Government, and the employee requests NBS to file an application on the invention, the application should be filed using the criteria of (1) above, except that only use by the Government is considered.
- b. In applying the criteria, the Committee takes into consideration the following primary factors:

(1) An invention is most likely to find commercial success when it fulfills a need in Government or private industry and is fully developed.

(2) An invention that is basic in nature, even though not fully developed, should be patented because of the broad claims that may be obtained in the patent which would protect further development of improvements that are likely to find wide commercial application.

(3) A patent should be obtained on an invention for recognition purposes when it is directly related to a primary mission of NBS and represents a significant advance in the field of that mission.

c. Other factors which influence the decisions made by the NBS Committee on Patents include the following:

(1) As long as NBS patents are not available for exclusive licensing, both patenting and publication make an NBS invention available for unrestricted use.

(2) Patenting an invention is more expensive than publishing it--the added legal expenses amount to about \$1,500 per patent.

(3) NBS employees do not receive any special kind of recognition for patent contributions. Patents and publications are considered "roughly equal" when used for purposes of performance evaluation.

2. NBS Inventions Summary: The following table shows a breakdown of the disposition of NBS employee invention disclosures for FY-72, 73, and 74.

NBS Invention Summary

| <u>Invention Disclosures</u> | <u>FY-72</u> | <u>FY-73</u> | <u>FY-74</u> |
|--|--------------|--------------|--------------|
| Assignable to the Government (funded by NBS) | 11 | 9 | 21 |
| Patent application filed | 3 | 2 | 12 |
| Published | 5 | 4 | 5 |
| No protection | 3 | 3 | 4 |
| All rights retained by inventor (license to the Government, shop rights) | 2 | 1 | 1 |
| All rights retained by inventor (invention is not job related) | 29 | 8 | 14 |
| Assignable to the Government (funded by and forwarded to another agency) | 8 | 16 | 8 |
| NBS contractor disclosures | 0 | 6 | 3 |
| Unpatentable or incomplete | <u>10</u> | <u>9</u> | <u>12</u> |
| Total disclosures received | 60 | 49 | 59 |

a. During this three-year period a total of 168 invention disclosures were received. Of these:

- (1) 50 (30%) were inventions in which NBS employees retained all rights, and 4 (2%) were inventions in which NBS employees retained all rights with a license to the Government.
- (2) 32 (19%) were inventions made by NBS employees who were working on projects sponsored by another agency, and the invention disclosure was forwarded to that agency.
- (3) 9 (6%) were submitted by NBS contractors.
- (4) 31 (18%) were incomplete or unpatentable.
- (5) Only 41 (24%) were funded by NBS and assignable to the Government. Patent applications were filed on 17 of these Government-owned invention.

3. NBS Contractor Inventions: On August 23, 1974, the President issued a Statement of Government Patent Policy for inventions made in the course of any contract with a Government agency.

The Statement established three categories of contracting situations. In the first, the Government normally acquires title to the invention; in the second, the contractor normally acquires title; and in the third, the rights in the invention are determined after the invention has been identified.

In the second category, when the contractor declines to file a patent application for the invention, the Government may acquire title to the invention. In the first and third categories, the contractor may request greater rights in the invention than a non-exclusive license, e.g., a limited exclusive license or title to the invention subject to a license to the Government. Such requests involving DoC contracts are forwarded to the Assistant Secretary for Science and Technology in accordance with Departmental procedures, who applies the criteria set out in the Presidential Statement in determining whether greater rights should be retained by the Contractor.

During the last three fiscal years, NBS received nine invention disclosures from its contractors. Six of the inventions submitted by a single contractor fell in the first category, but the contractor did not request greater rights in the inventions than a non-exclusive license. Three of the inventions fell in the second category and the contractors could have acquired title to

the invention but declined to do so. After evaluation, the NBS Committee on Patents decided that no protection was required of any of the inventions and all the disclosures were inactivated.

4. Commercial Use of NBS Inventions: While it is not possible to determine the overall commercial use of past NBS inventions, it is instructive to consider cases which illustrate the factors that appear to influence the commercial use of NBS inventions. These factors are:

- a. The potential market for the invention.
- b. The amount of development needed to bring the invention to the point of practical application.
- c. The way in which the invention is made available to the private sector (patented or published); if patented, the type of licensing available.

Considering the last two factors above (presumably these factors could be controlled to some extent by NBS) the following three NBS inventions have been chosen to illustrate different categories of incentives for commercial use.

- (1) The Magnetic Clutch: This invention, which was disclosed in 1947 by Jack Rabinow, was subsequently patented by NBS and made available in the U.S. for non-exclusive licensing. The invention was thought to require a considerable amount of additional development to be brought to the point of practical application. The invention was licensed in the U.S., but used only in those applications where no other device was practicable.

DoC elected to assign foreign patent rights to the inventor, who with private financial backing filed for patents in several foreign countries, thus making the magnetic clutch invention available on an exclusive licensing basis outside the United States. By the late 1950's, Renault, Hilman, and Peugeot had purchased licenses under the patents, and subsequently developed and used the magnetic clutch in several models of their automobiles. It was also used for many industrial applications.

- (2) The Hydraulic Turbine Dental Drill: In 1953 Carl Pelander (Senior NBS instrument maker), John Kumpula (NBS laboratory mechanic) and Robert Nelsen (NBS Research Associate from the American Dental Association) published a detailed description of a contra-angle handpiece containing a small

turbine propelled by a high speed stream of fluid in a closed system. This instrument had been developed to the point of practical application at the time of publication.

Although the use of fluids as motive power for dental rotary cutting instruments had been described in U.S. patents going back as far as 1875, the NBS instrument was regarded as a very significant advance in the art. By 1958 several patent applications had been filed on modifications of the NBS instrument, and by the mid-1960's the use of hydraulic turbine contra-angle handpieces had become wide-spread.

(3) The Electrode-less Deposition of Nickel: In 1950

Abner Brenner and Grace Riddell disclosed an invention which accomplished the deposition of nickel from solution without the use of conventional electrodes. This process was patented by NBS and made available for non-exclusive licensing. The process required little additional development and could be used without major modification of existing nickel plating equipment. Since this patent was granted, 170 non-exclusive licenses have been issued on the process, and the invention is being widely used.

These three examples have been chosen to illustrate some of the positive and negative results of NBS's current patent practices. In each case the invention was eventually used. It is difficult to estimate how many, if any, NBS inventions have not been used because of NBS's patent practices.

II. Findings

A. Strengths and Weaknesses in the NBS's Patent Practices

Starting from the basic assumptions that NBS should encourage inventive activity in its laboratories, and that efforts should be made to encourage the timely development and use of NBS inventions, the strengths and weaknesses of current NBS invention and patent practices are summarized as follows:

1. Strengths: The investigations of the Committee support the contention that inventive activity within NBS compares well with that of other technical organizations in the Government.
 - a. While invention disclosure and patenting can be important mechanisms for transferring technology and obtaining commercial utilization of innovative NBS research results, there are other important mechanisms which are being used effectively for the same purpose.

- b. NBS scientists and engineers, in the course of their work, often help develop innovative technical solutions for technical problems which are then promoted through papers and talks and by demonstrations to visitors--often without an apparent need to determine whether or not the technical solution qualifies as a patentable invention. This situation may result in fewer NBS invention disclosures that might be made if all NBS technical outputs were carefully screened for possible inventive concepts.
 - c. The fact that non-exclusive licenses have been issued on a fair number (33) of NBS's patents may indicate that a manufacturer can be encouraged to market an item embodying an NBS invention because he is assured that the Government, and not someone else, holds the patent on the invention.
2. Weaknesses: The weaknesses of the current patent program at NBS appear to be due in part to problems inherent to the awkward position of Government agencies in the U.S. patent system, and in part to the relatively non-aggressive posture NBS has taken toward encouraging inventive activity and invention disclosure on the part of its employees, and toward encouraging the timely development and use of NBS inventions in the private sector.

- a. No employee awards are given for invention disclosures or patent applications, and there has been no systematic effort to recognize NBS inventors whose inventions have been used in industry.
- b. In cases where significant private investment is needed to bring NBS inventions to the point of practical application, NBS has no effective way to encourage such investment. The current practice of licensing NBS patents on a non-exclusive basis discourages private investment in these cases. In the absence of private sector incentives to undertake such developmental work the question of whether to publish or patent an NBS invention becomes a question of how best to protect the Government and the general public from paying royalties to someone who is not the first inventor. If this defensive strategy is the primary NBS strategy, NBS's patent practices are not consistent with the general NBS goal to promote the transfer of inventive technology from the public to the private sector.
- c. The method currently used to determine whether NBS inventions should be patented or published requires that the NBS Committee on Patents make judgements concerning the potential commercial success of an invention. Such judgements are very difficult to make within the NBS '

environment because the Committee lacks detailed knowledge of the state of the industrial art in which the invention might be used.

III. Recommendations

A. The Basic Premise

The public interest in a dynamic and efficient economy requires that efforts be made to encourage inventive and innovative activity among NBS scientists and engineers, and to encourage the timely development and use of NBS inventions.

Recommendation 1. Under the provision of Chapter 45 of Title 5 of the U.S. Code, and Section 2.04.b of the DoC Administrative Order 202-451, concerning "Incentive Awards Programs," NBS should establish an Inventor Award Program to improve the climate for inventive activity and encourage invention disclosure by its employees. It is recommended that cash awards of \$100 be given to NBS inventors for each invention disclosure that is assignable to NBS and is recommended for publication or patent application by the NBS Committee on Patents; this award should be given to the inventor when a patent application is filed or when the publication appears. Further, it is recommended that NBS establish a special award of up to \$25,000 that may be granted to an NBS employee when it is determined that his invention has made an outstanding contribution to society.

Recommendation 1 seeks to change the relatively passive position now taken by NBS management toward employee inventiveness, to an active and aggressive position reflecting a commitment to encourage inventive activity and invention disclosure. The recommended awards for invention disclosure via patent applications or publication are similar to those given by NASA. The proposed award to recognize inventors whose inventions have made outstanding contributions to society is similar to an award now being considered by NBS management (Attachment 1: Draft memorandum from the Director to John Will proposing an NBS Award to Recognize Superior Achievement in the Functional Application of Technology, particularly with regard to inventions and patents). However, this report recommends a higher limit for the cash award.

Recommendation 2. In cases where the NBS Committee on Patents determines that an NBS employee invention is directly related to an NBS mission, and that the invention requires further development to demonstrate its practical application, the Committee should report these conclusions to the appropriate NBS Institute Director so that further development is encouraged.

Recommendation 3. NBS management should continue its efforts to assist the Department of Commerce in its efforts to obtain authority to grant exclusive licenses on NBS patents in cases where it is deemed in the public interest to create added incentive for private investment to facilitate further development and marketing of such inventions.

Pending court actions may eliminate the need for NBS action on Recommendation 3 if the Government is successful in its appeal to the District Court's ruling against GSA's implementation of the Presidential Policy Statement granting exclusive licensing authority to Heads of departments and agencies. If the Government loses its appeal, NBS should encourage and assist DoC in its efforts to obtain statutory authority to grant exclusive licenses on department patents. Exclusive licensing should not be regarded as a cure-all for the NBS patent program, but rather as an added option to be used when necessary to promote the use of NBS inventions.

Recommendation 4. The criteria presently used by the NBS Committee on Patents to determine whether NBS inventions should be published or patented (Section E, Item 1) should be considered for revision as a separate undertaking, taking

into account the relative merits of patenting and publication as means for protecting NBS inventions, and for helping to promote their commercial use. Consideration should be given to: the economic potential of the invention; the amount of further development needed to bring the invention to the point of practical application; and to the possibility that limited exclusive licensing may become available and whether or not such licensing will be a necessary incentive for the investment of private risk capital to bring the invention to the market place.

Recommendations 2, 3, and 4 reflect the view that both patenting and publication are adequate disclosure modes for those NBS inventions that can be easily used in the private sector. The problem comes when an NBS invention requires further development that investors in the private sector are reluctant to undertake without the protection of exclusive license. The proposed solutions reduce this problem either by providing an opportunity for the development of such inventions by NBS, or by providing incentives for the private sector to undertake such development via limited exclusive licensing.

Recommendation 5. NBS should strengthen its program to disseminate information about NBS inventions to potential users. Such a program should include:

1. Continued public announcement of all NBS patents and patent applications in cooperation with the National Technical Information Service (NTIS) of the Department of Commerce; and, publication of brief descriptions of NBS inventions in NBS Technical Notes.
2. Additional promotional activities for NBS inventions selected to receive special emphasis. Such activities might include invitational conferences, the preparation of special displays for trade conventions, or offer of technical assistance, and could be undertaken in cooperation with NTIS when appropriate.

IV. Estimated Workload Increases and Implementation Costs:

A. Estimated Workload Increases

Implementation of the recommendations of this report would be expected to result in an increase in total workload spread over several existing NBS organizational units. Added functions would include:

Office of the Legal Adviser

- (1) Monitor and provide legal advice concerning pending court actions regarding exclusive licensing of government-owned patents.
- (2) Eventual processing of exclusive license applications, (if exclusive licensing becomes available) probably in accordance with GSA regulations.

NBS Committee on Patents

- (1) Participate in the review and revision of the criteria used for determining when NBS inventions should be published or patented.
- (2) Review and recommend action on nominations for special invention awards.
- (3) Recommend further NBS development of selected NBS employee inventions to the Director.

Incentive Awards Program

- (1) Administer automatic Inventor Awards Program.
- (2) Administer Special Inventor Awards Program.

Office of Information Programs

- (1) Administer NBS invention information activities.

An effective award program could be expected to increase the number of NBS invention disclosures. Estimating that the number of disclosures per 100 scientists and engineers would increase from approximately 3.7 to 5.0 (this estimate is based on the data in Table 1 showing other agency experience with employee invention disclosures), the number of NBS invention disclosures might be expected to increase from an average of 60 per year to approximately 80 per year.

B. Estimated Implementation Costs

1. Current Costs: The current annual direct cost of NBS's invention and patent program, including the staff of the Office of the Legal Adviser (Patent Adviser, GS-15; Patent Agent, GS-13; and Secretary, GS-4) and its contracted legal services, is approximately \$75K. Indirect costs associated with the operation of the NBS Committee on Patents are on the order of four professional man-months per year (estimated at \$12K) giving an estimated total of \$87K.

2. Additional Direct Costs:

a. Patent Processing: Assuming that the practice of contracting for the preparation of applications will continue, and that the number of NBS patent applications

will increase in direct proportion to the estimated increase for invention disclosures (about 30%), the added direct cost at \$1,500 per patent for 5 additional patents per year is \$7,500.

- b. Invention Awards: At the present time about 24 invention disclosures assignable to the Government are received each year. (See the chart in paragraph I.E.2. above.) Assuming that there will be an increase of 30% in disclosures, about 30 inventions will be received. If 80% of these are protected by patenting or publication and are therefore eligible for the \$100 award, the automatic award program would cost about \$2,400. Adding \$5K per year for special inventor awards, gives a total of \$7,400.

Thus, the estimated total direct cost increase is estimated at \$14,900 per year.

D R A F T

To: John Will
Director of Personnel
Through: Betsy Ancker-Johnson, Ph.D.
Assistant Secretary for S & T

From: Richard W. Roberts
Director

Subject: Proposed NBS Award to Recognize Superior Achievement in the
Functional Application of Technology, particularly with
regard to invention and patents

This is to recommend that the Director of the National Bureau of Standards be authorized to establish, approve, and present an "Applied Technology Award" to recognize superior achievement in the functional application of technology. The award, which may be granted once each year to NBS employee(s), will include a plaque and a honorarium up to \$1500.

The purpose of the award is to afford tangible recognition for superior achievement in the functional application of technology by employees of the National Bureau of Standards, and thereby to encourage the creative, practical application of existing technology through invention, innovation and patents.

Furthermore, the award will complement the NBS Incentive Awards Program since awards are presently established to recognize research contributions (The Stratton Award), the development of meaningful and significant standards of practice in the measurement field (The Rosa Award), and achievements by non-professional supporting services personnel (The Crittenden Award).

The "Applied Technology Award" will provide recognition for a significant contribution to science, engineering, or some area within the sphere of activity of the National Bureau of Standards as determined by the impact or potential impact of the contribution on society.

Nominations may be made by Associate Directors, Division Chiefs, and other senior staff members. Nominations will be called for by the Personnel Division in the usual way. To assist in reviewing nominations, the Director may call upon specialists at the Bureau or consultants from outside the Bureau. Final selection of recipients will be made by the Director.

As indicated in the enclosed letter from Dr. Harris, funding for the award will initially be provided through a \$5,000 gift. However, it is anticipated that the award will be a part of the continuing Incentive Awards Program and future funding will be provided by the National Bureau of Standards from its own funds. It is intended also that the award will be given no more often than yearly, and that no award will be made if the submissions do not warrant it.

Enclosure

CONCUR:

Betsy Ancker-Johnson, Ph.D.

Date

| | | | | |
|---|--|---|--|------------------------------|
| U.S. DEPT. OF COMM. BIBLIOGRAPHIC DATA SHEET | | 1. PUBLICATION OR REPORT NO. NBSIR 76-1006 | 2. Gov't Accession No. | 3. Recipient's Accession No. |
| 4. TITLE AND SUBTITLE Report of the Ad Hoc Committee on NBS Inventions and Patent Programs | | | 5. Publication Date March 1976 | |
| | | | 6. Performing Organization Code | |
| 7. AUTHOR(S) Ad Hoc Committee on NBS Patent Programs, Chairman | | | 8. Performing Organ. Report No. NBSIR 76-1006 | |
| 9. PERFORMING ORGANIZATION NAME AND ADDRESS NATIONAL BUREAU OF STANDARDS DEPARTMENT OF COMMERCE WASHINGTON, D.C. 20234 | | | 10. Project/Task/Work Unit No. | |
| | | | 11. Contract/Grant No. | |
| 12. Sponsoring Organization Name and Complete Address (Street, City, State, ZIP) National Bureau of Standards Department of Commerce Washington, D.C. 20234 | | | 13. Type of Report & Period Covered Final | |
| | | | 14. Sponsoring Agency Code | |
| 15. SUPPLEMENTARY NOTES | | | | |
| 16. ABSTRACT (A 200-word or less factual summary of most significant information. If document includes a significant bibliography or literature survey, mention it here.) An ad hoc Committee was established in June of 1974 to study NBS inventions and patents, and to determine what was needed to create a climate among NBS professional staff which would encourage innovative activity, and the disclosure of inventions. The Committee consisted of Arthur McCoubrey, Martin Greenspan, Ralph Barra, Claude Gravatt, David Robbins, Alan Farrar, and Karl Willenbrock, Chairman. The Committee was assisted by Peter Urbach, Deputy Director of NTIS; and Lawrence Eicher. This report contains the findings and recommendations of the ad hoc Committee. | | | | |
| 17. KEY WORDS (six to twelve entries; alphabetical order; capitalize only the first letter of the first key word unless a proper name; separated by semicolons) Government patent policy; Government-owned inventions; Inventions; National Bureau of Standards; Patents | | | | |
| 18. AVAILABILITY <input type="checkbox"/> Unlimited <input checked="" type="checkbox"/> For Official Distribution. Do Not Release to NTIS <input type="checkbox"/> Order From Sup. of Doc., U.S. Government Printing Office Washington, D.C. 20402, SD Cat. No. C13 <input type="checkbox"/> Order From National Technical Information Service (NTIS) Springfield, Virginia 22151 | | 19. SECURITY CLASS (THIS REPORT) UNCLASSIFIED | | 21. NO. OF PAGES |
| | | 20. SECURITY CLASS (THIS PAGE) UNCLASSIFIED | | 22. Price |

